

EPA Review Comments

Standard Operating Procedures
Submitted 31 August 1990

GENERAL COMMENTS

The sheer bulk of these documents is daunting, and could hinder their use. EPA recommends the following measures be taken to help alleviate this problem:

- (1) Incorporate the background material repeated in sections 3.0 and 4.0 of each SOP in an introduction for each volume.
- (2) Draft a separate SOP for documentation and eliminate the subsections on this issue in individual SOPs.
- (3) Eliminate the subsections on QA/QC. This should be covered in the QAPP or QAPjP. Note that current drafts of QA/QC documents are not adequate and will require revision to properly interface with the completed SOPs.
- (4) Delete overlapping discussions of decontamination; it has separate SOPs and yet is covered again (often introducing contradictions) in numerous others.
- (5) Use diagrams to present complex information such as well completion requirements and soil gas sampling apparatus setup. This will both improve and shorten the presentation.
- (6) It would be beneficial for each SOP to incorporate a checklist for use in monitoring compliance with the procedures as set forth therein.

If this is intended to be the complete set of SOPs, it seems several important items are missing. Most prominently, there are no SOPs for sampling and analysis of air. Similarly, the sampling and analysis of bulk waste, drums, structures, and equipment is not addressed, nor is surveying and mapping of sampling points. Also, environmental impact evaluations may require ecological studies, for which SOPs should be developed.

The purpose and scope section of each SOP states that the SAP (comprising the QAPjP and SOPs) has been reviewed and approved by EPA. In fact, the comments provided here constitute our review, and the QAPjP/SOPs will not receive EPA approval until an adequate revision has been submitted and reviewed.

The idea of including project-specific procedures in an SOPA is consistent with the IAG. However, it would be preferable if the procedures were incorporated in the Work Plan rather than submitted as an attachment. In any case, Work Plans reviewed to

date consistently assert that complete, detailed procedures for all ER activities will be in the SOPs; the SOPs claim much of this information will be in the Work Plans. It has to be one place or the other, not lost in between like it is now.

Extreme care must be taken to define terminology precisely and use it consistently throughout the SOPs and related QA/QC and Safety documents. The current draft SOPs are very sloppy in this regard. For example, the space surrounding an operating drill rig is variously referred to as an activity area, site, sampling site, restricted exclusion zone, work area, contaminated area, project area, and temporary work exclusion zone. All these terms are associated with different access, permit, safety, and operational requirements, many administered by different offices within DOE/EG&G; without some order imposed on this chaos, the field crew will never get set up on the hole before their gate passes expire.

The circumstances under which a Procedural Deviation Notice (PDN) will be used to change an SOP, the person(s) authorized to initiate and approve them, and the PDN approval/documentation process must be more thoroughly explained in the SOP. Otherwise this is a blank check, an open invitation to change established procedure whenever it becomes inconvenient.

Other general format changes would be beneficial: (1) A checklist outlining the procedures, equipment, and personnel required for each SOP provided as a reference guide; (2) cross-references to other SOPs including a page number; (3) one table of contents for all volumes; (4) inclusion of the SOP title in the page header; and (5) consistent use of references.

Volume 1.0 - Field Operations

GENERAL COMMENTS

Making procedural decisions according to an EG&G "Characterization" of "activity areas" based on historical information and a radiological survey of a larger "work area" potentially containing numerous IHSSs with different levels/types of contamination invites problems without offering much benefit. The SOPs indicate this characterization will direct the Personnel Protective Equipment (PPE) levels, handling of investigation-generated wastes, and the disposal of these wastes. If the idea is to limit the amount of time spent on decontamination or the amount of waste generated, consider that these apparent advantages may be more than outweighed by potential safety problems and the negative consequences of improper handling and disposal of contaminated materials. The prudent course would be to assume all materials and equipment originating from or used within an IHSS are contaminated and treat them as such until proven otherwise; and field monitoring with an OVD does not constitute proof. In any case, since wastes generated during the investigative process must be handled in a manner consistent with the Colorado Hazardous Waste Act (CHWA) and RCRA, the characterization procedure and results need to be submitted for approval prior to commencement of work.

SPECIFIC COMMENTS

SOPs 1.1 and 1.2. - Where are they?

SOP 1.3, Section 5.0. - Explain contaminant-free environment.

SOP 1.3, Section 5.1, Page 8. - Equipment storage might be better addressed in a separate SOP.

SOP 1.3, Section 5.2. - EPA guidance specifies decontamination should include an acid rinse for inorganics analyses and a solvent rinse for organics analyses. Since most samples from RFP will be run for both these, a single procedure must be used. The simple detergent and water method proposed would be adequate only if it can be demonstrated conclusively through analysis of rinsate blanks that no equipment contamination remains following decontamination. When possible, sampling should proceed from less contaminated points to more contaminated; in any case, rinsate blanks for all contaminants of interest must be taken a minimum of once a day. If a rinsate blank indicates contamination, all samples taken since the last clean rinsate blank will be suspect. As a general practice for RFP, EPA recommends a decontamination

procedure consisting of: 1) wash with laboratory-grade detergent; 2) tap water rinse; 3) reagent-grade isopropanol rinse; 4) air dry; and 5) triple-rinse with organic-free deionized water.

SOP 1.3, Section 5.2 - Step 4, when wrapping equipment, a non-reactive plastic must be used. If equipment is not decontaminated after use and is stored in plastic, the same plastic may not be used to store the equipment after it has been decontaminated.

The SOP requires washing with a wire brush. This is not consistent with the procedure outlined under general comments (Section 5.1).

SOP 1.3 Section 5.4. - Define the equipment used. Where necessary, supply a figure of the equipment illustrating the various parts to be decontaminated. Step 3. (section 5.4.1) requires discarding after use all silastic tubing. Define silastic and after use. Define distributor tubes as mentioned in step 5 (section 5.4.1). Step 5 of section 5.4.3 is not consistent with steps 1 through 4. Discarding of sample containers, as discussed in Section 5.4.4, must be specific. Section 5.4.6 requires air drying of cleaned sequential sample bottles. This requires that the bottles not be exposed to airborne contaminants during the drying process. Section 5.4.8 states that the decontamination procedure follow subsection 5.2, steps 1-6. However, Section 5.2 shows only 5 steps.

SOP 1.3, Section 5.4.3, page 12. This section states that reusable glass composite containers should be discarded after sampling. This does not make any sense. This section must clarify if these glass composite containers are reusable or disposable. If they are disposable, decontaminating them is unnecessary, but their disposal location must be specified.

SOP 1.3, Section 5.5. - Section 5.5.4 specifies glass tubing requires air drying. This requires that the tubing is stored so that it is not exposed to contaminants during drying.

SOP 1.3, Section 5.5.2, Page 14. - Teflon tubing should not be reused at a different sample point.

SOP 1.3, Section 5.6. - A test for incomplete rinsing of decon solution is by conductivity. If this is a required step, the SOP must state this.

SOP 1.3, Section 5.6.2, Page 16. - Whenever possible, dedicated pumps or bailers should be used.

SOP 1.3, Section 5.6.7, Page 17. - Periodic analysis of the Milli-Q water should be performed and results recorded.

SOP 1.3, Section 5.7. - The document outlines procedures for

cleaning background sample collection equipment. It is then stated that this procedure cannot be used for organic or trace metal samples. It is not clear what the procedure is for these types of samples. It appears that more information is necessary. Criteria must be established for determining when it is necessary to clean flow measuring equipment.

SOP 1.3, Section 6.1. - It is not clear if and when the procedures for testing rinse water are to be conducted.

SOP 1.4, Section 5.1 - In towing heavy equipment by trailer or tow, precautions must be taken to avoid further contamination of ground or transport equipment. Procedures outlining this must be provided. In addition to a radiation monitor, an Hnu must be provided to monitor for VOC contamination where necessary.

SOP 1.4, Section 5.2. - Basic information on the location, configuration, operation, and maintenance of decontamination station(s) should be included here. The use of semi-permanent stations within remote OUs should be applied as a means of limiting the potential for contaminant dispersion as a result of vehicle movement. If planned and executed properly, this can largely eliminate the need for and potential problems associated with moving contaminated equipment along roads used by the public or unprotected workers.

SOP 1.4 Section 6.1. - An explanation is necessary on how the work areas will be characterized as not contaminated prior to investigative work. A copy of form 1.4A, Heavy Equipment Decontamination/Wash Checklist and Record must be provided as it is referenced in this section.

SOP 1.4 Section 6.2. - This section describes decontamination in the field. This is not consistent with Section 5.2 which discusses the benefits of decontamination in a central location. A central location can be used effectively for certain purposes, but its use has limits, and other measures must be included in a comprehensive program to control contaminant dispersion during investigative work.

SOP 1.4, Section 6.3. - The objective is to ensure that no contaminated material leaves the operable unit. Radioactivity is not the only concern in this regard. Use of portable steam cleaning equipment and proper placement of facilities allow much better decontamination within the unit than simply removing "obvious accumulations" of potentially contaminated materials.

SOP 1.4 Section 6.3. - State the method(s) by which the Radiation Protection Technician (RPT) will check for radioactivity.

SOP 1.4, Section 6.4.2. - Cabs of vehicles used in OUs should be pre-lined with plastic sheeting to the extent practicable to help

prevent contamination.

SOP 1.4, Section 6.4.2. - Procedures for field and/or central station decontamination of downhole equipment were supposed to be in here (according to SOP 1.3) where are they?

SOP 1.4 Section 6.4.2. - Air and fuel filters may become contaminated and would need to be checked and replaced if necessary.

SOP 1.4 Figure 1. - The determination of the PPE clothing must be made in accordance with the Health and Safety Plans for the site. Boot coverings are not listed in figure 1.

SOP 1.4 Section 6.4.3. - A check for effectiveness of decontamination is necessary prior to reuse of equipment.

SOP 1.5 Section 5.0. - A Radiation monitor is also necessary. A log of the drums' contents must be kept. Drums must be labeled and dated as to when purge and development water were received. It is not clear how the site characterizations will be determined prior to investigations. Another category of waste to be expected is mixed radioactive and RCRA regulated hazardous waste (mixed waste).

SOP 1.5, Section 6.0. Page 7. - Drilling fluids are not to be used unless field conditions make all other alternative methods ineffective. If they are used, they must be contained and handled in accordance with procedures established for handling/disposal of drill cuttings and purge water.

SOP 1.5, Section 6.1, Page 8. - Who are "EG&G's Waste Operations personnel" and what rules do they play by for waste storage, treatment, and disposal? All investigation-generated waste must be managed in accordance with the CHWA and RCRA.

SOP 1.5, Section 6.1. - A radiation monitor is also necessary to determine the type of waste generated during field activities. The liquid wastes stored in the gray drums will need to be analyzed for waste characterization. If the waste in the drums is found to contain hazardous or mixed waste, then any mixing of this water into the liquid waste area will cause the entire waste mixture to be considered as hazardous or mixed waste. EG&G personnel will also need to be responsible for keeping records as to the location of wastes collected and the date of collection.

SOP 1.5, Section 6.2. - Please explain what, and where, the "designated liquid waste area" referred to here is, and note that any such facility must comply with the substantive requirements of RCRA and the CHWA.

SOP 1.5 Section 6.2. - The type of environmental monitoring

measurements to be taken must be mentioned. Additionally, the definition of background to compare the measurements against is necessary. In the absence of a signed IAG, dumping of waste into the liquid waste facility may result in its designation as a hazardous waste or mixed waste unit under RCRA and CHWA.

SOP 1.5, Section 9.0. - Please explain how this system accounts for the decontamination and reuse of drums per section 6.2.

SOP 1.5 Section 10.0. - The Technical Enforcement Guidance Document (TEGD), EPA, 1986 was listed in previous sections and is appropriate here.

SOP 1.5 Form 1.10A. - The form provided does not have a space for the date the drum was sent to the field and the date of decontamination as stated in section 9.1.

SOP 1.6, Section 6.1.2, Page 7. - The role of the Waste Management Coordinator (WMC) was not mentioned in SOP 1.5, or under the responsibilities section. This bodes ill for required future coordination between the WMC, the Site Specific Project Manager and the work plans for that particular site.

SOP 1.6, Section 6.2. - An explanation is necessary as to how and where the drums will be handled/stored once full.

SOP 1.6 Section 7.0. - The location of the project files must be identified.

SOP 1.7 Section 4.0. - The document states that the subcontractor's site manager is responsible for the transportation of potentially contaminated liquid waste to storage tanks in the main decontamination area. Explain how this coordinates with the WMC's duties as defined in SOP 1.6.

SOP 1.7 Section 5.0. - Equipment lists must include log books for tracking the waste generated.

SOP 1.7 Section 6.0. - See comments for SOP 1.5 Section 5.0. Radionuclide readings must also be taken into account.

SOP 1.7, Section 6.1. - The document states that the EG&G Waste Operations personnel will be responsible for the handling of wastes. Explain how this coordinates with the WMC's duties as defined in SOP 1.6. The transport of decontamination water in drums must be done with the top secured in place, and splash prevention procedures must be clearly defined in SOP 1.4 or in this SOP to avoid personal injury.

SOP 1.7, Section 6.2. - Prior to disposal of wash water, the water must be checked with an OVA and radiation field monitoring equipment in order to prevent release of contaminated waste to

the environment. It is stated that the water will not be disposed within 200 feet from any stream or drainage. Samplers will need to have a map from which they can determine if they are within the 200 foot criteria. This will become more important in times of heavy snow cover.

SOP 1.7, Section 7.0. - This is inconsistent with the QAPjP currently under review, and with other SOPs, which reference the Work Plans and/or QAAs as the documents covering site-specific QA requirements.

SOP 1.7, Section 10.0. - The TEGD is an appropriate reference for this section.

SOP 1.7, Form 1.10A. - See comments on SOP 1.5.

SOP 1.8, Section 5.0. - This equipment list is very different than the one provided in SOP 1.5, while the tasks are very similar. This discrepancy should be justified or eliminated.

SOP 1.8, Section 5.0. - A field instrument for monitoring for radionuclide contamination is necessary. Field notebooks are important for recording activities and any problems.

SOP 1.8, Section 6.3. - Explain routine use of OVD. Are there decontamination procedures for the shovel used in predrilling procedures? A field instrument for radionuclide monitoring must be used to detect contamination during the activities in the work area. Readings from the OVD and radiation field instruments must be recorded in a field notebook. The document must reflect this.

SOP 1.8, Section 6.3.1.1. - Justification must be provided for removing the upper 20 cm of soil before beginning sampling in light of the fact that some of the main contaminants of interest should reasonably be concentrated in that interval. If surface soil is removed, it cannot simply be spread on the ground as described. It must be managed and disposed of using the procedures established for drill cuttings.

SOP 1.8, Section 6.3.1.4. - In the time interval before remeasurement of volatiles as part of the verification process, the media of interest must be isolated from the atmosphere to prevent volatilization of the contaminants.

SOP 1.8, Section 6.3.2. - See SOP 1.7 Section 6.2.

SOP 1.8, Section 6.4.1.1. - All drums must be labeled with information indicating at a minimum, the dates waste was put into the drums, the location of waste collected and the sampler.

SOP 1.8, Section 10. - RFPM MAT 20-005, Policies: Rocky Flats Plant, Use and Color Coding of Drums, 1989 is an appropriate

reference for this SOP.

SOP 1.8, Form 1.8A. - A destination, ie. drum number, to which the waste was sent must be provided.

SOP 1.9, Section 5.1, Page 6. - The relationship (if any) between the "90-day holding facility" where residual samples go and the "Central Decontamination Area" where cuttings go need to be explained. If they are not the same, why not?

SOP 1.9, Section 5.1, Page 7. - The phrase "appropriate holding facility" leaves open several questions that must be answered. How many such facilities are there, and where are they? How and by whom is the determination of which one is appropriate made?

SOP 1.9, Section 5.1. - It is not clear what information will be provided to the subcontractor by EG&G. If the residual material is returned from the laboratory, will analyses be available for the characterization prior to disposal of the residual materials? The proper storage and disposal of all wastes at the 90-day holding facility must be in accordance with the substantive requirements of the Colorado Hazardous Waste Act (CHWA) and RCRA.

SOP 1.9, Section 5.2.1. - Provide the location and configuration of the "designated core facility."

SOP 1.9, Section 5.2.2. - Again, within this document are presented distinctly different procedures based on a questionable "characterization" of the sampling site. In this case valuable information will potentially be lost through the destruction of most soil cores. These should be preserved intact for possible reexamination until RFI/RI work in the subject unit is completed.

SOP 1.9, Form 1.9a. - It is not clear what the date of request is. The form must include information that allows the tracking of the waste from the time it was generated to the time it was shipped back to Rocky Flats. At a minimum, the date the sample was shipped to the lab, the date of return and the date of the transfer to the holding area is needed. The results of the chemical analysis of the soil can be attached to the RLSRL information sheet. This analysis will allow for a determination on the type of waste present and therefore direct the handling and storage of the waste.

SOP 1.10, Section 4.0. - The responsibilities described in this section does not mention the WMC as defined in SOP 1.6 Section 6.1.2. There does not seem to be consistency between the SOPs as to management and responsibility of the waste generated at the investigation sites and decontamination area. Clarification on the responsible parties is necessary. An organizational chart for Volume 1 would be beneficial.

SOP 1.10, Section 6.0. - This section mentions the WMC. Is this the same WMC as that indicated in the other SOPs?

SOP 1.10, Section 6.2, Page 10. - All previous SOPs specify use of grey drums for "contaminated" areas. The introduction of the color scheme, overpacking, etc. at this stage is very confusing, especially since when, why, and how they change colors is not explained until much later, and then not very well. In addition, it is implied that soil drums will be characterized based on analytical results of "representative" samples originating in the same hole(s) as the drummed soils. Indirect characterization may be necessary for PPE, which cannot be readily sampled directly; a much better description of the procedure as applied to soils and some justification for its use must be included.

SOP 1.10, Section 6.2. - The definition of solid waste does not seem to be consistent with the regulatory definition of RCRA.

SOP 1.10, Section 6.2. - See comments under SOP 1.5 Section 5.0.

The drum ID number scheme is a good idea. This is not mentioned in the other SOPs and is not reflected in the forms 1.8, 1.9 and 1.10A (form 1.10A is not submitted).

SOP 1.10, Section 6.2.2. Page 13. - Experience indicates the volume of PPE and miscellaneous waste will be equal to or greater than the soil wastes (excluding cores), and could present a bigger disposal problem.

SOP 1.10, Section 6.2.2. - Labeling of drums by spray painting must not be done during sampling or monitoring events to prevent contamination. This section discusses storage of drums on pallets. The other SOPs must also address this. It is stated that the drums will be inspected on a monthly basis. Once drums are filled, the drums must be moved to a secure area for storage. Storage conditions must meet the substantive requirements of CHWA and RCRA. Form 1.10 C was not submitted.

SOP 1.11. - All procedures in this section must be consistent with the sitewide health and safety and site specific plans.

SOP 1.12, Figure 5-1. - The page is blank.

SOP 1.12, Section 5.2. - EPA reserves the right to perform unannounced site visits for oversight purposes.

SOP 1.12, Section 5.6. - Media contacts must be in accordance with the requirement stated in the Federal Facilities Compliance Agreement (IAG). For contaminant characterization see comments on SOP 1.5 Section 5.0.

SOP 1.12, Section 5.7.1, Page 10. - Work Plans (Field Sampling

Plans) submitted to date have not mapped or identified any "work" or "activity" areas.

SOP 1.12 Section 5.7.2. - The site-specific plans for the work area must also be reviewed. How does this relate to the FOP?

SOP 1.12, Section 5.7.3. - This information belongs in the Health and Safety Plan.

SOP 1.12, Section 7.0. - The sitewide and site-specific health and safety plans must be listed.

SOP 1.13, Section 5.0. - Chain of custody (COC) forms are also necessary.

SOP 1.13, Section 6.1. - This information belongs in the QAPP, where it does not currently appear.

SOP 1.13, Section 6.2. - The sample number and location of the sample must be recorded in the field samplers book.

SOP 1.13, Section 6.3.3. - Chain of custody modification procedures belong in the QAPP.

SOP 1.13, Section 6.4. - The Documentation SOP should stipulate where the field data forms (and other field generated forms) go when complete, and by whom, where, in what form, and how long these records will be maintained.

SOP 1.13, Section 6.5. - The packaging and shipping requirements for all types of samples to be shipped must be mentioned in this section rather than referring to an appendix. Low, medium, and high level concentration must be defined. Coordination with the receiving laboratory will be required to comply with their restrictions on radionuclide content in samples for other analyses. It will not do any good to ship the samples if the laboratory will not accept or cannot properly analyze them.

SOP 1.13, Section 6.5, page 15. The laboratory should be notified if the shipper suspects that the sample contains any other substance for which the laboratory personnel should take safety precautions.

Medium-and-high-concentration samples are defined as hazardous and additional precautions must be taken. Some of these are:

- They must be placed in a paint can. The can is filled with vermiculite, and the lid is fixed to the can. The lid must be sealed with six metal clips or with evidence tape. Arrows are placed on the can to indicate which end is up.
- A liquid sample of an uncertain nature is shipped as a

flammable liquid with the shipping name "FLAMMABLE LIQUID, N.O.S." and the identification number "UN1993".

- A solid sample of uncertain nature is shipped as a flammable solid with the shipping name "FLAMMABLE SOLID, N.O.S." and the identification number "UN1345".

SOP 1.13, Section 7.0. - This information has nothing to do with shipping. It belongs in the QAPP and/or the sampling SOPs. No one will ever find it here.

SOP 1.13, Section 7.3. - Explain (in the QAPP) why trip blanks are only used for VOA analyses.

SOP 1.13, Section 7.5. - It is not clear if the Matrix Spike (MS) samples will be collected in the field or prepared in advance. A discussion of the preparation and use of matrix spike/matrix spike duplicates (MS/MSDs) should be in the QAPP, where it does not currently appear.

SOP 1.13, Section 9.0. - The TEGD is an appropriate reference for this section.

SOP 1.13. - The list of forms is incomplete (compare with SOP 1.14 Section 9).

SOP 1.14. - This SOP covers only field data, the tip of the iceberg compared to lab data, and then not very well. A comprehensive data management plan is a good idea, but this SOP has a long way to go if it is to serve that purpose.

SOP 1.14, Section 4.0. - The document states that the EG&G Project Manager will be responsible for implementing the SOP. Site visits and discussions by EPA with Rocky Flats indicate that the data base management is not project specific. An overall database system is in place which does or will contain data representing the different media collected from the entire plant site. It is not clear who the project manager is that will be responsible for implementing this SOP.

SOP 1.14, Section 5.1. - Autocad - version 10.0 is also required for implementation of the RFEDS system.

SOP 1.14, Section 5.4. - If the validator detects an error in the data report sheet, the validator must confer with the samplers and the project manager prior to changing any information. Any changes made must be recorded in the project manager's log book.

SOP 1.14, Section 5.5. - Analytical data received from the laboratory must also be verified after the data is entered into the RFEDS system.

SOP 1.14, Section 5.7. - Data will need to be submitted to EPA on a regular basis. The SOP must reflect this requirement. There is no mention of the security process for data protection.

SOP 1.14, Forms. - The SOP does not address input of air data into the data base. Form 1.14F must include a space for amount of material recovered.

SOP 1.15. - Only two of many field instruments that might be used are covered here. Similar treatment should be given to pH meters, radiation detectors, water level probes, etc. Inclusion of instrument diagrams is beneficial.

SOP 1.16, Section 5.1.1. - The minimum measurement points and configuration for a pre-work area Fidler survey may vary for the area of study. An explanation of the background cutoff reading of 250 cpm is necessary.

SOP 1.16. - No mention of radionuclide screening of samples or materials taken offsite is presented. It has been a Rocky Flats policy to screen purge water from monitoring wells prior to collection of samples for offsite analysis by the Colorado Department of Health (CDH) laboratory. This screening procedure and associated cutoff levels must be explained. Calibration records must be kept on the radiological monitoring equipment.

Volume 2.0 - Groundwater

GENERAL COMMENTS

In general this volume is more complete and technically more sound than the preceding one. However, instead of covering only one available method of aquifer testing (Pump-In Borehole Packer Tests) SOPs should be established for other testing methods reasonably expected to be appropriate for use in some areas. Also, none of these SOPs reflects the position established in the conditionally approved Operable Unit 2 (OU2) Phase II RFI/RIFS workplan on the use of well clusters and the limitation of screened intervals to a maximum of 10 feet. This procedure either needs to be incorporated in the SOPs or the reasons why it is only applicable to OU2 provided.

Groundwater protocols must reflect special attention to the need to collect high quality hydrologic data and record unusual occurrences or departures from written procedures. It is very difficult to fully interpret water chemistry or to define the actual extent of contamination without high quality hydrologic data. It may be advisable to collect the hydrologic data at more frequent intervals and at finer spatial scale than that used for the chemical data. This would help to assure that measurements define hydraulic conductivity both vertically and horizontal across the site. Using hydrologic data along with pH, temperature measurements and mean seasonal flow rates, one should evaluate the initial performance of the well and use these values for periodic redevelopment and maintenance assessments.

SPECIFIC COMMENTS

SOP 2.1, Section 3.0, Page 5. - This is the SAP. Telling us that it should specify devices and procedures for measuring water levels accomplishes nothing. Water level measurements must be completed at a minimum on a quarterly basis to determine seasonal fluctuations in the water table.

SOP 2.1, Section 5.0, Page 7. - The last bullet on the page states that the water level measurements should be collected within a 24-hr. period. It is not clear from what event marks the beginning of the 24-hr. period. Due to other activities (i.e. pumping wells) occurring on plant site that may affect water level measurements, it is necessary for water-level measurement samplers to coordinate with other groups on plantsite and to record the date and time of measurements.

SOP 2.1, Section 5.1. - As mentioned above, a separate SOP should be developed for surveying and mapping of all sampling points, not only wells. This should establish benchmarks, coordinate

systems, and required accuracies. This is the place to specify if marking of measuring points (MPs) with ink is permitted or not.

SOP 2.1, Section 5.3.1.2. - Again, this is the SAP. Don't tell us what should be here, put it in.

SOP 2.1, Section 7.0. - The information recorded should include weather conditions at the time of measurement. Note that the MP value represents a distance above the land surface datum (LSD), so the measured depth to water minus MP yields depth below LSD.

SOP 2.1, Section 8.0. - The QAPjP is insufficient. Particular QA/QC procedures pertaining to this SOP must be identified in the Quality Assurance Plan.

SOP 2.1, Section 8.2. - The first sentence here confirms the suspicion raised by reading these documents, that the QAPP and SOPs are being prepared by two groups who have not been introduced. This facilitates fiasco.

Changes to the MP must also be noted in the field office possibly by making a note on the schedule. DOE is the well owner and the measurements are being conducted as part of their studies. Therefore, it is not necessary to get the well owner's permission to measure.

SOP 2.2, Section 5.2.1. - To clarify, the volume removed should be at least three times the combined volume of the casing and the saturated annular space (at 50% porosity). Five times this figure is preferable. A method must be specified for measuring and recording the volume of any fluids added to the hole so the required development volume can be calculated. Development should be conducted no sooner than 48 hours and no longer than 2 weeks after completion. For wells with turbidity greater than 5 NTU, the turbidity evaluation procedure in Figure 3-4 of the TEGD should be followed.

Use of a submersible pump for well development should be considered as necessary to promote sediment removal. An example calculation to determine the well casing volume and saturated annular space volume must be provided. The frequency of well development must be determined.

SOP 2.2, Form 2.3A. - The time of well development is not the form as indicated in the text on page 10.

SOP 2.3, Section 5.2. - This document should consider the effects of ground-water pumping on existing waste plumes when conducting packer tests.

SOP 2.3, Section 5.2.1. - The source(s) of water approved for use in these (and all) well tests must be specified. Please explain

or reference the reason for selecting 5 minutes as the minimum injection time; how the effective overburden pressure will be determined; and how the values of 0.5 psi per foot, 0.43 psi per foot, and 0.07 psi per foot were determined.

SOP 2.3, Section 6. - The following criteria should be used to determine the accuracy or completeness of information on hydraulic conductivity measurements:

- Values of hydraulic conductivity between wells in similar lithologies should not exceed one order of magnitude difference. If values exceeded this difference, the information provided was not enough to sufficiently define a potential flow path, or there is a mistake in the logs.
- Hydraulic conductivity information generally provides average values for the entire area across a well screen. For more depth discrete information, well screens will have to be shorter. If the average hydraulic conductivity for a formation is required, entire formations may have to be screened, or data taken from overlapping clusters.

SOP 2.3, Form 2.3A. - Records of pressure and flow rates with time, pulse pressure and pulse decay time and data file names are not recorded on the form as stated in section 7.0.

SOP 2.5, Section 5.1, Page 8. - The use of and requirements for PPE must be specified in the Health and Safety Plan. Limiting discussion of this issue to appropriate cross references at this and similar points in the SOPs would provide the required information and avoid introducing contradictions.

SOP 2.5, Section 5.5. - Report specific conductance in units of sieman (s). Provide a conversion chart if instruments read in micromhos, and standardize readings at 25 degrees C.

SOP 2.5, Section 5.8. - Turbidity units are inconsistent with Section 2.2, use either NTU or FTU, not both.

SOP 2.6. - The format and organization of this SOP differs from most of the others noticeably. This not only produces confusion for the user, but also suggests it was prepared by yet another autonomous group. Coordination must be improved.

SOP 2.6, Section 6.0. - The sampling equipment lists includes equipment to measure silica. This was not mentioned in SOP 2.5, Measurement of Groundwater Field Parameters.

SOP 2.6, Section 7.0. - This section first references and then contradicts SOP 1.3. One correct presentation of decontamination procedures with appropriate cross-references would be preferable.

SOP 2.6, Section 9.0. - This section introduces one more variation on the decontamination procedure, without any explanation of why this particular application should be different. In any case, this information belongs in the decontamination SOP.

SOP 2.6, Section 10.2.1. - Dedicated bailers should be used whenever possible. They should be fitted with a teflon-coated steel leader of length greater than the depth of water in the well. This can be attached to a nylon rope.

SOP 2.6, Section 10.2.2. This section should state that positive displacement bladder pumps, if used, should be operated in a continuous manner so that they do not produce pulsating samples that are aerated in the return tube or upon discharge.

SOP 2.6, Section 11.0. - The frequency of field parameter instrument calibrations is not consistent with those listed in Table 1 in SOP 2.5. If measuring of field parameters after sampling indicates that the water sampled was not representative of the formation water, then the well must be resampled. Discharge of purge water must follow SOP 1.5, Handling of Purge and Development Water, requirements approved by EPA and CDH. The procedure stated here is not consistent with the procedures stated in SOP 1.5. Explain the difference between the nitrate level in the initial purge water and the post purge water that triggers containerizing the purge water. It is not prudent to decide on which wells shall be sampled for nitrate before investigative studies are initiated. Wells monitoring water that flow from the solar evaporation ponds are also candidates for nitrate testing. In general, the specific parameters to be measured at each operable unit must be spelled out in the site specific workplan.

SOP 2.6, Section 12.1. - The required order of sampling should be added to Table 1 in this SOP (which also appears in SOP 1.13); this should not be subject to change by the field team. In wells that bail dry, VOC samples should be taken as soon as the well has recovered sufficiently to provide the required volume. The reference to SOP 1.5 on page 29 is incorrect.

The amount of water sufficient for collection of the VOC sample and duplicate must be stated. The site specific work plans must include any modifications to sample suites that are necessary for particular wells. Sample preservation methods must follow those stated in SOP 1.13, once approved. Sample bottles for VOCs must be filled in a manner that least agitates the water flow (this may be by filling the bottles from the top of the bailer rather than the bottom).

SOP 2.6, Section 12.3. - The sample for radiation screening was not specified in Subsection 12.1.

SOP 2.6, Section 13.0. - A key point not mentioned here is that the numbering of samples and generation of labels must be closely coordinated with the analytical laboratory, which may have special numbering, format, and content requirements to permit proper sample tracking during analysis and reporting. Properly labeled, prepared sample containers for all scheduled analyses must be on hand before the sampling crew goes to the field.

SOP 2.6, Table 1. - This table is incomplete (extractable organics) and incorrect (preservation). The table included in SOP 1.13 Appendix A should be referenced here, and should itself include primary references for the information displayed.

SOP 2.6, Section 14. - This material belongs in the QAPP.

Volume 3.0 - Geotechnical

GENERAL COMMENTS

During negotiations for the IAG schedules, much was made about the unique and difficult drilling conditions at RFP and the resultant necessity to use a "2nd-hole" drilling technique, where one hole would be used to sample down to and locate the alluvial/bedrock interface, then a second, adjacent hole would be drilled to allow alluvial well installation. DOE used this to justify extremely slow progress and exceptionally high projected costs. Please explain why the SOPs make no mention of this.

The conditional approval of the OU2 work plan included the stipulation that detailed procedures for drilling in high-hazard areas such as the 903 Pad and the East Trenches would be included in the SOPs. It appears they are not, and that the SOP authors expect such information to be included in Work Plans. Unless this information is added to the SOPs, the OU2 Plan will require revision or amendment and resubmittal for regulatory review/approval before field work begins.

Diagrams illustrating the different types of drilling equipment and well installations would enhance the procedures described in the text. For wells intended for long-term sampling use, redevelopment and maintenance must be addressed.

EPA letters dated February 1990 and November 1989 regarding guidelines for construction in and near SWMUs must be referenced and included in the SOPs. Procedures need to be added that address shut-down criteria during wind speeds exceeding health and safety requirements (See plans for the 881 Hillside IM/IRA).

The cross references to other pertinent SOPs are generally incomplete for all SOPs in this volume. Main exclusions are: personal protective equipment, field communications, decontamination, use of PIDs and FIDs, data base management, field radiological measurements, and waste handling.

Geophysical investigation techniques would logically fall under this volume, yet the only mention made of them here covers only borehole clearance procedures. With the many geophysical techniques currently available for both surface and downhole applications, it should be assumed they will be appropriate for some areas, and SOPs developed accordingly. Careful consideration must be given to the use of these techniques in preparing work plans, as they sometimes offer the opportunity to gather sufficient information while largely avoiding the hazards and expense of invasive approaches.

SPECIFIC COMMENTS

SOP 3.1, - Preprinted log forms for field logging speed up the logging time and assure inclusion of all necessary data.

SOP 3.1, Section 5.1.2.1. - It is not clear which grain size scales will be used in characterizing textures.

SOP 3.1, Section 5.1.4. - Figure 2 illustrating the use of the U.S.C.S. soil sample classifications is missing.

SOP 3.1, Section 5.1.5. - Problems with using U.S.C.S. are stated. The document does not state how these problems will be addressed.

SOP 3.1, Section 5.2.2. - Table 1 does not show the six Wentworth grain size categories. Pages 20 and 21 (figures 3 and 4) are missing.

SOP 3.1, Section 5.2.2.4. - The method for estimating porosity is not stated.

SOP 3.1, Section 5.2.3. - Figure 5 is missing. It would be beneficial for the loggers to have field access to copies of Figure 5.

SOP 3.1, Section 5.2.4. - Figure 6 is missing.

SOP 3.1, Section 5.2.6. - Explain how the cement medium will be identified.

SOP 3.1, Section 5.2.10. - Recording of fracture density can be important in analyzing the local structure.

SOP 3.1, Section 6.2.1. - The drill interval and core box number (i.e. box 1 of 5) must also be recorded on the core boxes.

SOP 3.1, Section 6.3.2. - Definition of safe (in terms of level of contamination) is necessary. If samples are collected from the core, SOP 3.2 detailing the sampling procedures must be referenced.

SOP 3.1, Section 6.3.3. - Loggers must state percent recovery and missing core sent to sampling.

SOP 3.1, Section 6.3.4. - It is beneficial to have a scale in the identification tag.

SOP 3.2, Section 3.0. - Other drilling and sampling techniques must be presented if the possibility of using them is present.

SOP 3.2, Section 5.0, Page 6. - Sampling for chemical analysis is covered here, not in SOP 3.1 as referenced.

SOP 3.2, Section 5.2, Page 9. - This section contradicts the referenced decontamination SOPs, and must settle the question of lubricants. Lubricants should only be used on downhole equipment as a last resort and an approved list or specification for analysis and selection of them must appear here. A standardized scheme for well numbering should also be included.

SOP 3.2, Section 5.3.1. - This discussion apparently stipulates compositing the entire 2 to 5-foot core. (Why is unclear, as this only dilutes both the constituents present and the utility of the analytical results.) Consequently, it ignores several key soil sampling issues, including: (1) the criteria and procedures used to select sampling intervals; (2) procedures for removal and preparation of sub-samples for extractable organics analysis, which should not be composited; and (3) provisions for taking VOA samples from other than the pre-targeted interval based on core examination and field testing.

SOP 3.2, Form 3.2A. - Also noted on the form must be any decontamination of equipment and sample collection for QA/QC.

SOP 3.3, Section 5.1.1. - The criteria for selection of surface casing type (i.e. PVC or steel) must be presented.

SOP 3.3, Section 5.2. - Specify auger, casing, and well diameters, and the clearances required between each.

The text reads that boreholes will be drilled 2 feet into the top of weathered bedrock, and then states that the bottom of casing will be placed 2 feet below the weathered bedrock surface. Please provide a diagram to clarify what "surface" is being referred to and show well casing and screen placement relative to the various formations and interfaces. Boreholes must extend to a depth sufficient to establish the extent of contamination and characterize bedrock contamination, if present.

SOP 3.3, Section 5.3. - The proposed completion procedure includes the apparently unnecessary drilling of holes around the bottom of the surface casing, which could allow contact with the target formation water and alter the well chemistry (pH). Lifting the casing slightly while grout is forced under it and up the annular space, then pushing it into the confining formation, will produce a better seal and less problems. A small quantity of approved (non-chlorinated, potable) water placed above the grout before inserting the swab (rubber plug) will facilitate both cleaning the casing interior and withdrawing the swab after the grout sets--which is not mentioned, but must be done.

SOP 3.3, Form 3.3A. - The form must include information

requirements presented on p. 11 of this SOP.

SOP 3.5, Section 3.0, Page 4. - The referenced SOP (3.11) was not submitted.

SOP 3.5, Section 5.2. - A determination should be made based on site specific field experience whether conductor casing of boreholes not completed as wells is really necessary.

SOP 3.5, Section 5.2. - An analysis of the grout is necessary. An estimation of the time it takes for the grout to settle must be provided so that the abandonment procedure is not left unfinished. For deep boreholes where relatively large quantities of fluids can be generated during abandonment, procedures to prevent runoff must be included. Construction of lined pits or grading the area must be done so as not to cause spread of contamination by wind dispersion or runoff.

SOP 3.6, Section 5.2. - Centralizers should not be installed within the sand pack, unless the screen cannot otherwise be held in position. It is inadvisable to use spray paint in areas where VOA screening and sampling will take place. Flagging is a preferable marker. The depth of a borehole may not be known prior to drilling in cases where the depth to a desired stratigraphic unit is not known. The depth would then need to be determined during evaluation of core or cuttings during drilling.

SOP 3.6, Section 5.3. - The statement that the well casing will consist of PVC is not consistent with SOP 3.3 Section 5.1.

SOP 3.6, Section 5.3.1.2. - Use type 304 continuous wire-wrap stainless steel screen with slot size selected to match grain size in the target formation.

SOP 3.6, Section 5.3.2.1, Page 12. - The amount of filter pack and grout added to the well annulus must be recorded. Place cement-bentonite grout with a **side-discharge** tremmie pipe from the top of the bentonite seal to the frost line. A single-pour concrete seal and surface cap goes above that (See the TEGD). Do not place protective casing until well passes tests for plumbness and alignment, standards for which belong here.

SOP 3.6, Section 7.0, page 14. For each monitoring well installed, a monitoring completion diagram or well log should be submitted. This form should contain information in the appropriate column as follows:

- Well number
- Project number and name
- Location
- Geologist or engineer
- Ground elevation

- Well installation date
- Drilling contractor
- Drilling methods
- Water levels before and after development
- Development method

A summary of the lithologies encountered during drilling or USCS symbols, and construction details must also be included.

SOP 3.7, Section 5.2.1. - Any movement of material during excavations must be preceded by screening for VOA and radionuclides. In areas of known contamination, it may be necessary to wet the soil prior to excavating to eliminate the possibility of windblown dispersion of soils. If land ban and other hazardous wastes, radioactive or mixed waste are detected, additional procedures must be added to the SOP so that activities are consistent with the substantive requirements of RCRA and the Colorado Hazardous Waste Act (CHWA). Air monitoring will be necessary if there is potential for material to be suspended. (See EPA and CDH letters regarding construction guidelines for SWMUs). All stockpiles must be covered in a way to prevent runoff as well as dispersal to prevent contaminant release.

All excavations deeper than 4 feet (not 5 feet as stated in this section) must be stabilized before entry by bracing the pit sides using wooden or steel support structures. Entry should be avoided whenever possible through the use of remote sampling techniques. Overland flow of water from and the erosion or sedimentation of stockpiled saturated soil should be controlled. Temporary detention basins and drainage systems should be used as necessary to prevent the spread of contaminants.

SOP 3.7, Section 5.2.2. - Pits and trenches will need to be mapped where such geologic information is necessary. Photo-documentation of configuration and contents is recommended.

SOP 3.7, Section 5.2.5. - Surveying standards belong in the to-be-developed surveying SOP.

SOP 3.8, Section 5.2.2. - An explanation is necessary as to the grain sizes that will be collected for the sampling. That is, is the sampling method based on collection of a certain size fraction of the soil?

SOP 3.8, Section 6.0. - Sampling with other hand implements (augers, hollow tubes) needs to be included here, where the discussion of PID testing of soil gas doesn't belong.

SOP 3.8 Forms. - Form 3.8B is missing.

SOP 3.9. - In general this SOP is vague, incomplete, and poorly written. It never specifies a procedure, instead stringing

together a loosely associated series of possible sample collection techniques, and fails to discuss the multifarious field GC analysis process at all.

SOP 3.9, Section 5.3.1.1. - Diagram the equipment setup and specify the instruments to be used, analytical standards to be prepared, and compounds to be targeted.

SOP 3.9, Section 5.3.1.2. - Several items on these lists contradict each other, such as letting the hole "breathe" for ten minutes--before doing what is not clear--as opposed to hooking up a pump and evacuating the soil gas immediately after reaching the predetermined depth.

SOP 3.9, Section 6.0. - The SOP combined with the QAPP define QC procedures. Deferral to the project plans and procedures is inappropriate. If large discrepancies between duplicate samples exists, it may be appropriate to take another sample.

SOP 3.10, Sections 5.2.1 and 5.3.1. - It is not prudent for Rocky Flats to use paint in an area where future sampling for volatile organics may occur.

Volume 4.0 - Surface Water

GENERAL COMMENTS

Several SOPs in this volume contain a great deal of theoretical material which could be left out or referenced. This is another distressing departure from the structure of previous volumes, again illustrating the need for coordination among preparers. Similarly, the sampling procedures, containers, preservatives, and holding times for surface water and tap water samples should be consistent with those for groundwater. The current draft includes many small but important discrepancies in this regard, which must be corrected.

SPECIFIC COMMENTS

SOP 4.1, Section 5.1.1. - The checklist presented here is a good idea, and could be used to condense and improve the discussions of required equipment included in other sampling SOPs.

SOP 4.1, Section 5.3. - Explain how the residual chlorine analysis will be performed and how the results impact field preparation of VOC samples.

SOP 4.3, Section 5.2.3. - VOC samples must not be collected using the USGS churn splitter as agitation is unavoidable.

SOP 4.3, Section 5.3.4. - An annotated diagram/example would help this presentation tremendously. If you didn't know how to do this, you would never figure it out from this description.

SOP 4.3, Section 5.3.6. - Correct, existing surface water sampling locations are on large ponds. These must continue to be sampled, if that can't be done using this SOP, then another one explaining how it is currently done and how it should be done must be included. If SOP 4.8 is supposed to cover this material, then make sure it does and reference it here. It is important to avoid sediment in the sample; sample clarity must be noted.

SOP 4.4, Section 5.1.2.4. - The procedure for spin-testing current meters (Pygmy and Price AA) should be described, in accordance with instructions provided in the 1967 Bureau of Reclamation "Water Measurement Manual" and the test should be performed before and after stream measurements.

SOP 4.5, Section 5.3. - Define what and where the "base lab" is.

SOP 4.6, Section 5.1. - This dissertation is interesting, but not necessary in this context.

SOP 4.6, Table 1. - The page is blank.

SOP 4.7. - The flow rate at VOC sample points should be less than 100 ml/minute.

SOP 4.8, Section 4.1. - None of the other SOPs contain a section analogous to this one, but given the complexity of this issue at RFP, perhaps they should.

SOP 4.8, Section 5.2. - This section largely repeats material from the standing water and sediment sampling descriptions. Incorporation by reference could shorten this discussion considerably.

SOP 4.9. - The large amount of repeated material here could be reduced by appropriate references.

SOP 4.9, Section 5.2, Page 12. - The stream gaging program mentioned here should be described in the surface water sampling and/or discharge measurement SOPs.

SOP 4.9, Section 5.3. - The start date for the static bioassay will need updating for the final SOP submittal.